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(54) Packaging machine and method

Vorrichtung und Verfahren zum Verpacken

Machine et procédé d'emballage

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Description

[0001] This invention relates to a packaging machine and a method of making packages by means of a packaging machine. More particularly, this invention relates to a method of making packages by increasing the volume density of the articles that are to be packaged and a packaging machine which makes use of such a method.

[0002] Packages of articles which are easily breakable and low in volume density, such as potato chips, are difficult to handle efficiently because a large amount of package-making material is required to package them and the costs of their transportation are high. In view of this problem, U.S. Patent 5,540,035, for example, disclosed a method of shaking the articles which have been dropped into a bag before it is sealed such that the volume of the batch of articles to be sealed in is reduced. If this technology is applied to a large-scale packaging machine adapted to package twice or three times more articles in each bag than a packaging machine of a normal size, however, it is not possible to effectively increase the volume density of articles inside the bag, and the packaging speed is adversely affected significantly.

[0003] Reference is made here to document US-A-1 278 562.

[0004] It is therefore an object of this invention in view of this problem of the prior art technology to provide an improved method of producing large packages while efficiently increasing the volume density of the articles, as well as a packaging machine using such a method.

[0005] In accordance with one aspect of the invention, there is provided a packaging method comprising the following steps:

- a. clamping a tubularly formed film with a shaker at a first clamping position on said film;
- b. dropping sequentially a first batch to an $(n-1)^{th}$ batch of articles from a total of n batches of articles into said tubularly formed film whilst it is clamped by said shaker;
- c. shaking each of said first batch to said $(n-1)^{th}$ batch of articles using said shaker prior to dropping the next batch in the sequence;
- d. dropping the n^{th} batch of articles into said tubularly formed film;
- e. clamping said tubularly formed film with said shaker at a second clamping position on said film above said n batches;
- f. dropping another first batch of articles into said tubularly formed film whilst it is clamped by said shaker;
- g. shaking simultaneously both said another first batch of articles above said second clamping position and said n batches of articles below said second clamping position; and
- h. using a transverse sealer to seal said tubularly formed film beneath said n batches of articles to

form a bottom of a bag prior to performing step (e).

[0006] The user may use an input device to input various packaging conditions such as the length of each bag to be made and the packaging speed (that is, the number of packages to be produced per unit time). A packaging machine according to this invention includes a control unit which determines whether the film should be transported intermittently or continuously by comparing at least one of the inputted packaging conditions and a preliminarily stored value such as a packaging speed. The steps described above are carried out if the control unit concludes that the film should be transported in an intermittent mode. If the control unit concludes that the film should be transported in a continuous mode, the film is pulled down in a continuous motion without subjected to the shaking by the shaker.

[0007] The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention in the drawings:

25 Fig. 1 is a schematic representation, in part as a block diagram, of a packaging machine embodying this invention;

30 Figs. 2A and 2B are respectively a plan view and a side view of the shaker of the packaging machine of Fig. 1;

35 Figs. 3A, 3B, 3C, 3D, 3E and 3F are schematic drawings for showing the sequence of packaging operations by the packaging machine of Fig. 1 in an intermittent mode of film transportation;

40 Fig. 4 is a timing chart for the packaging operations of Figs. 3A, 3B, 3C, 3D, 3E and 3F;

45 Figs. 5A, 5B, 5C, 5D and 5E are schematic drawings for showing the sequence of packaging operations by the packaging machine of Fig. 1 in a continuous mode of film transportation; and

50 Fig. 6 is a timing chart for the packaging operations of Figs. 5A, 5B, 5C, 5D and 5E.

[0008] The invention is described next by way of an example. Fig. 1 shows schematically the structure of a packaging machine embodying this invention. An elongated bag-making material (the "film") 100 is transported to a former 2 to be thereby bent into a tubular form around a tubular structure which is integrally formed with a hopper 1, and is pulled down along this tubular structure by means of a pair of pull-down belts 31 (only one of the pair being visible in Fig. 1) driven by a belt-driving motor 33 controlled by a control unit 9. The pair of pull-down belts 31 and a longitudinal sealer 32, comprising a heater to seal together the mutually overlapping side edges of the film 100, together form a pull-down mechanism 3, disposed below the former 2.

[0009] Disposed below this pull-down mechanism 3 and immediately above a transverse sealer 7 is a shaker

5 for causing the articles being dropped from a weigher (not shown) into the interior of the bag in the making. While clamping the tubularly formed film 100 in an coordinated way with the operation of the weigher such that the volume density of the articles will be increased. The transverse sealer 7 is for sealing the tubularly formed film 100 in the transverse direction and comprises a pair of seal jaws 71 and jaw-operating motors 73 and 74 controlled by a control unit 9 for causing the pair of seal jaws 71 to undergo a cyclic motion along generally D-shaped trajectories, as disclosed more in detail, for example, in U.S. patent 5,753,067. Numeral 10 indicates an input device through which a user may input "packaging conditions", such as the length of the bags to be produced, the target weight of articles to be packaged in each bag, the packaging speed or the number of packages to be produced per unit time, on which operations of various kinds are to be carried out.

[0010] Explained more in detail, the shaker 5 is adapted to clamp a portion of the film 100 periodically, once every time the film 100 is pulled down by a distance equal to the length of the bags being made. In a mode of operation wherein articles with a desired total weight are dropped successively in two batches to produce a packaged bag, for example, the shaker 5 shakes the articles of the first batch which are dropped in first, thereby increasing their volume density. The shaker 5 then releases the clamping as articles of the second batch are dropped into the film 100. As a result, the articles fill the interior of the tubularly formed film 100 at an increased volume density with the bottom of the bag sealed transversely.

[0011] Figs. 2A and 2B show the structure of this shaker 5 more in detail. Its main body (the "shaker main body") 51 is in the form of a frame, surrounding the tubularly formed film 100, and is attached to a pair of left-hand side and righthand side frame structures 53 through a shaft 52 penetrating the shaker main body 51 in the direction of its width (the vertical direction in Fig. 2A) so as to be able to oscillate. At one end of the shaker main body 51 in its longitudinal direction (the horizontal direction in Fig. 2A) is a longitudinally extending shaft 54 which is eccentrically coupled through a connecting bar 58 with the shaft 56 of a decelerating gear 55 such that the rotary motion of a shaker motor 57 for shaking, controlled by the control unit 9, is converted into an up-and-down motion such that the main body 51 will undergo an oscillatory motion in the vertical direction around the shaft 52.

[0012] A pinion 61 is affixed to one end of this shaft 52 penetrating the shaker main body 51, engaging a rack 60 which is adapted to be driven by a driver cylinder 59, controlled by the control unit 9, to undergo a reciprocating forward-backward motion in the longitudinal direction. A belt 64 is supported between a driver pulley 62 affixed to the shaft 52 and a follower pulley 63 on the shaker main body 51. A pair of shutters 66 and 67 is attached to the mutually oppositely facing surfaces of

this belt 64 such that these shutters 66 and 67 can be moved towards or away from each other by moving the rack 60 backward and forward to move the belt 64.

[0013] In Fig. 2, numeral 68 indicates a sensor for counting the number of oscillations of the shaker main body 51 by detecting a plate 69 attached to the shaft 56 of the decelerating gear 55. The control unit 9 serves to control the operations of the motions of the motors 33, 57, 73 and 74 for the pull-down belts 31, the shaker main body 51 of the shaker 5 and the transverse sealer 7. The timing for the control of these motors by the control unit 9 is explained next with reference to sketches in Figs. 3A, 3B, 3C, 3D, 3E and 3F, as well as the timing chart of Fig. 4.

[0014] If the packaging speed inputted through the input device 10 is greater than a preselected specified value ("specified packaging speed") preliminarily stored in the control unit 9, or if articles to be packaged together to make one package are dropped together all at one 20 as a single batch according to a selected mode of operation, the control unit 9 carries out a normal continuous mode of film transportation, transporting the film 100 in a continuous manner without shaking the articles which have been dropped in. If the inputted packaging speed 25 through the input device 10 is less than the specified packaging speed, or if the articles with a target total weight are dropped successively in a plurality of batches according to a selected mode of operation, on the other hand, the control unit 9 advances the film 100 intermittently by a distance equal to the length of the individual bags to be made.

[0015] Let us now consider a mode of operation wherein articles having a target total weight are dropped successively in two batches, each weighing about one 35 half of the target weight. This mode of operation is described, for example, in U.S. patent 4,508,185 and hence will not be described herein in detail. After a cycle of operations including weighing and packaging (say, at time t_a in Fig. 4), the seal jaws 71 of the transverse sealer 7 are stopped at specified initial positions (indicated by numeral 710 in Fig. 1) immediately before they contact each other, the shutters 66 and 67 of the shaker 5 are stationary while clamping the tubularly formed film 100 as shown in Fig. 3A, and the pull-down belts 31 are 40 at rest. When the weigher receives a ready signal from the packaging machine under this condition, requesting a discharge of weighed articles, a batch of articles with a total weight equaling about one half of the target total weight is measured and dropped into the tubularly formed film 100 in a clamped condition, and the shaker motor 57 rotates for a specified length of time T_1 (from time t_b in Fig. 4), causing the shaker main body 51 to oscillate up and down around the shaft 52 so as to increase the volume density of the articles which have been dropped, 45 as shown in Fig. 3B. Thereafter, when a second batch of articles weighing also about one half of the target total weight (such that the sum of the weights of the first and second batches of articles equals the target total weight)

is dropped from the weigher as shown in Fig. 3C in response to another ready signal outputted from the packaging machine and a discharge-end signal indicative of the completion of a discharge of articles is returned from the weigher at time t_c , the motors 73 and 74 for the seal jaws 71 begin to rotate after a short wait period of T_2 . After still another period of time T_3 (at time t_d), the seal jaws 71 engage each other immediately before the articles of the second batch reach the shaker 5 and seal the bottom edge of the bag being formed. At the same time (at time t_d), the downward motion of the film 100 is started in synchronism with the rotary motion of the seal jaws 71 and the driver cylinder 59 is also activated so as to cause the pair of shutters 66 and 67 to move away from each other through the rack 60, the pinion 61 engaging with the rack 60, the driver pulley 62 which rotates with the pinion 61, and the belt 64 stretched between the driver pulley 62 and the follower pulley 63. As a result, the articles of the first batch of which the volume density has been increased by the shaker 5 and the articles of the second batch received subsequently are together dropped into the bag being formed with its bottom edge sealed between the seal jaws 71, as shown in Fig. 3D.

[0016] The film 100 is pulled down by the pull-down belts 31 at the same speed as the downward motion of the seal jaws 71 on the straight line portions of their generally D-shaped trajectories. By time t_c when the film 100 is pulled down by a distance equal to the length of the bag being made, the first and second batches of the articles are together completely inside and the seal jaws 71 are back at their specified initial positions 710, as shown in Fig. 3E. After the downward motion of the film 100 is also stopped around the same time, the shutters 66 and 67 wait for a specified period T_4 until the dropped articles settle and then clamp the film 100 above these articles. At the same time t_c , the shaker 5 is activated again as shown in Fig. 3F, causing the shaker main body 51 to oscillate around the shaft 52 up and down so as to increase the volume density of not only the articles of the second batch already inside the closed bag but also the next batch of articles dropped in the meantime for the next bag to be produced. Thus, a space is created above the enclosed articles for transversely sealing the film 100 with the seal jaws 71, and the sequence of steps described above is repeated thereafter.

[0017] Let us consider next a situation wherein the film 100 is pulled down in a continuous manner and articles having a target total weight are dropped in together as a single batch. In this mode of operation, the shutters 66 and 67 remain open and the shaker 5 is kept inactive. Fig. 5A shows a situation at time t_a as shown in Fig. 6 prior to the output of a ready signal. If a ready signal is outputted from the packaging machine (at time t_b in Fig. 6) under this condition and the weigher discharges weighed articles in a single batch and outputs a discharge-end signal (at time t_c in Fig. 6), the control unit 9 causes the jaw-operating motors 73 and 74 to

start moving the seal jaws 71 and the belt-driving motor 33 to start pulling down the film 100 after waiting for a predetermined period of time T_2 (at time t_d) as shown in Figs. 5B and 5C such that the seal jaws 71 close the bag in time to receive the article batch thereabove, as shown in Fig. 5D. Thereafter, the seal jaws 71 continue to rotate and the film 100 continues to move down as shown in Fig. 5E, and the seal jaws 71 transversely seal the film 100 to form simultaneously the top seal of the bag which has just been filled and the bottom seal of the bag to be filled in the next cycle of operation. If the next ready signal is thereafter outputted from the packaging machine (at time t_a) and a discharge-end signal is received from the weigher in response, the pull-down belts 31 is continuously rotated and the seal jaws 71 are caused to undergo another cycle of rotary motion at the same time, as described above. If no discharge is made and no discharge-end signal is accordingly outputted from the weigher, for whatever reason, as indicated by a dotted line at time t_f in Fig. 6, the control unit 9 causes the seal jaws 71 to complete the transverse sealing to thereby close the top end of the bag which has just been filled in the previous cycle of operation and to return to, and to rest at, their specified initial positions 710, stopping the pull-down belts 31 after a predetermined period of time T_5 has elapsed from the moment when a discharge-end signal was normally to be received, as shown in Fig. 6.

[0018] Although the invention has been described above for a mode of operation wherein articles with a target total weight are dropped in two batches to make each package, the articles of the first batch being shaken after being dropped such that their volume density is increased before the articles of the second batch are dropped, this is not intended to limit the scope of the invention. In general, articles with a target total weight may be dropped consecutively in n batches where n may be any integer equal to or greater than 2, and the bag may be shaken by the shaker after articles of each of the first $(n-1)$ batches have been dropped. Articles of all n batches are added together to form one package only after the articles of the n^{th} batch (the "final batch") are dropped.

[0019] Thus, the bag is shaken after each time articles of one of the first $(n-1)$ batches are dropped such that their volume density is increased, and the bag is finally sealed and shut after the final batch of articles is dropped in. In this manner, packages with a smaller volume can be produced according to this invention such that their costs of production as well of transportation can be significantly reduced, since this operation for increasing the volume density of the articles is carried out simultaneously with the transverse sealing of the film, the packaging speed is not adversely affected. In a mode of operation wherein the tubularly formed film is transported intermittently, furthermore, the speed of film transportation can be increased to thereby increase the distance along which the film is stroked such that the

so-called browsing effect can be enhanced.

[0020] The disclosure given above is intended to be interpreted broadly. It goes without saying that the packaging machine of this invention can be operated not only with a weigher adapted to drop in article batches according to their weights but also with a device adapted to supply article batches according to their volumes or number of individual articles.

Claims

1. A packaging method comprising the following steps:

- a) clamping a tubularly formed film (100) with a shaker (5) at a first clamping position on said film (100);
- b) dropping sequentially a first batch to an $(n-1)^{th}$ batch of articles from a total of n batches of articles into said tubularly formed film (100) whilst it is clamped by said shaker (5) where n is equal or greater than 2;
- c) shaking each of said first batch to said $(n-1)^{th}$ batch of articles using said shaker (5) prior to dropping the next batch in the sequence;
- d) dropping the n^{th} batch of articles into said tubularly formed film (100);
- e) clamping said tubularly formed film (100) with said shaker (5) at a second clamping position on said film above said n batches;
- f) dropping another first batch of articles into said tubularly formed film (100) whilst it is clamped by said shaker (5);
- g) shaking simultaneously both said another first batch of articles above said second clamping position and said n batches of articles below said second clamping position; and
- h) using a transverse sealer to seal (7) said tubularly formed film (100) beneath said n batches of articles to form a bottom of a bag prior to performing step (e).

2. A packaging method according to claim 1, wherein, during step (d), said film (100) is released from said first clamped position and the transverse sealer (7) seals said tubularly formed film (100) beneath said n batches of articles to from the bottom of the bag whilst said tubularly formed film (100) is moved by a pull-down mechanism (3) in a transport direction by the length of the bag.

3. A method according to any of the preceding claims, wherein said tubularly formed film (100) is transported along a film path and said shaker (5) is disposed on said film path.

4. A method according to any of the preceding claims,

wherein said shaker (5) shakes said film (100) in an up-and-down motion.

5. A packaging machine comprising:

- a transverse sealer (7) for transversely sealing a tubularly formed film (100);
- a shaker (5) disposed upstream from said transverse sealer (7) for clamping said tubularly formed film (100) at a specified clamping position and for shaking articles held inside said tubularly formed film (100) above said clamping position, and
- a control unit (9) adapted to cause the transverse sealer (7) and shaker (5) to perform a first packaging method comprising the following steps:

- a) clamping said tubularly formed film (100) with said shaker (5) at a first clamping position on said film (100);
- b) dropping sequentially a first batch to an $(n-1)^{th}$ batch of articles from a total of n batches of articles into said tubularly formed film (100) whilst it is clamped by said shaker (5) where n is equal or greater than 2;
- c) shaking each of said first batch to said $(n-1)^{th}$ batch of articles using said shaker (5) prior to dropping the next batch in the sequence;
- d) dropping the n^{th} batch of articles into said tubularly formed film (100);
- e) clamping said tubularly formed film (100) with said shaker (5) at a second clamping position on said film (100) above said n batches;
- f) dropping another first batch of articles into said tubularly formed film (100) whilst it is clamped by said shaker (5);
- g) shaking simultaneously both said another first batch of articles above said second clamping position and said n batches of articles below said second clamping position; and
- h) using said transverse sealer (7) to seal said tubularly formed film (100) beneath said n batches of articles to form a bottom of a bag prior to performing step (e).

6. The packaging machine of claim 5 further comprising a pull-down mechanism (3) for forming said tubularly formed film (100) and pulling said film (100) downwards; and wherein the control unit (9) is further adapted, during step (d), to release said film (100) from said first clamped position and seal said tubularly formed film (100) beneath said n batches of articles to form the bottom of the bag whilst said

tubularly formed film (100) is moved by the pull-down mechanism (3) in a transport direction by the length of the bag.

Patentansprüche

1. Verfahren zum Verpacken, umfassend die folgenden Schritte:

- a) Einklemmen einer schlauchförmigen Folie (100) mit einer Schüttleinrichtung (5) an einer ersten Klemmposition an der Folie (100);
- b) aufeinanderfolgendes Einfüllen einer ersten bis zu einer (n-1)-ten Menge von Artikeln einer gesamten Menge n von Artikeln, in die mittels der Schüttleinrichtung (5) eingeklemmte Folie (100), wobei n gleich oder größer als 2 ist;
- c) Schütteln jeder der ersten bis zur (n-1)-ten Menge von Artikeln unter Verwendung der Schüttleinrichtung (5) vor dem Einfüllen der folgenden Menge;
- d) Einfüllen der n-ten Menge von Artikeln in die schlauchförmige Folie (100);
- e) Einklemmen der schlauchförmigen Folie (100) mit der Schüttleinrichtung (5) an einer zweiten Klemmposition an der Folie oberhalb der n-Mengen;
- f) Einfüllen einer weiteren ersten Menge von Artikeln in die mittels der Schüttleinrichtung (5) eingeklemmten schlauchförmigen Folie;
- g) gleichzeitiges Schütteln der weiteren ersten Menge von Artikeln oberhalb der zweiten Klemmposition zusammen mit den n-Mengen von Artikeln unterhalb der zweiten Klemmposition; und
- h) Verwenden einer Querversiegelungseinrichtung (7) zum Versiegeln der schlauchförmigen Folie (100) unterhalb der n-Mengen von Artikeln zur Ausbildung eines Bodens eines Beutels vor der Durchführung von Schritt (e).

2. Verfahren nach Anspruch 1, wobei während Schritt (d) die Folie (100) von der ersten Klemmposition freigegeben wird, und die Querversiegelungseinrichtung (7) die schlauchförmige Folie (100) unterhalb der n-Mengen von Artikeln zur Ausbildung des Bodens des Beutels versiegelt, wobei die schlauchförmige Folie mittels eines Nachunten-Ziehmechanismus in einer Förderrichtung um die Länge des Beutels bewegt wird.

3. Verfahren nach einem der Ansprüche 1 oder 2, wobei die schlauchförmige Folie (100) längs einer Folienbahn gefördert wird und die Schüttleinrichtung (5) an dieser Bahn angeordnet ist.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei

die Schüttleinrichtung (5) die Folie in einer Auf- und Abbewegung schüttelt.

5. Vorrichtung zum Verpacken, umfassend:

eine Querversiegelungseinrichtung (7) zum Querversiegeln einer schlauchförmigen Folie (100), eine stromaufwärts der Querversiegelungseinrichtung (7) angeordnete Schüttleinrichtung (5) zum Einklemmen der schlauchförmigen Folie (100) an einer bestimmten Klemmposition und zum Schütteln der in der schlauchförmigen Folie (100) oberhalb der Klemmposition angeordneten Artikel, und eine Steuereinheit (9) zur Durchführung eines ersten Verfahrens zum Verpacken mit der Querversiegelungseinheit (7) und der Schüttleinrichtung (5) mit folgenden Schritten:

- a) Einklemmen einer schlauchförmigen Folie (100) mit einer Schüttleinrichtung (5) an einer ersten Klemmposition an der Folie (100);
- b) aufeinanderfolgendes Einfüllen einer ersten bis zu einer (n-1)-ten Menge von Artikeln einer gesamten Menge n von Artikeln, in die mittels der Schüttleinrichtung (5) eingeklemmte Folie (100), wobei n gleich oder größer als 2 ist;
- c) Schütteln jeder der ersten bis zur (n-1)-ten Menge von Artikeln unter Verwendung der Schüttleinrichtung (5) vor dem Einfüllen der folgenden Menge;
- d) Einfüllen der n-ten Menge von Artikeln in die schlauchförmige Folie (100);
- e) Einklemmen der schlauchförmigen Folie (100) mit der Schüttleinrichtung (5) an einer zweiten Klemmposition an der Folie oberhalb der n-Mengen;
- f) Einfüllen einer weiteren ersten Menge von Artikeln in die mittels der Schüttleinrichtung (5) eingeklemmten schlauchförmigen Folie;
- g) gleichzeitiges Schütteln der weiteren ersten Menge von Artikeln oberhalb der zweiten Klemmposition zusammen mit den n-Mengen von Artikeln unterhalb der zweiten Klemmposition; und
- h) Verwenden einer Querversiegelungseinrichtung (7) zum Versiegeln der schlauchförmigen Folie (100) unterhalb der n-Mengen von Artikeln zur Ausbildung eines Bodens eines Beutels vor der Durchführung von Schritt e.

6. Vorrichtung nach Anspruch 5, weiter umfassend einen Nachunten-Ziehmechanismus (3) zur Ausbildung der schlauchförmigen Folie (100) und zum

Nachuntenziehen der Folie (100), wobei die Steuerinheit weiter während Schritt d die Folie (100) von der ersten Klemmposition freigibt und die schlauchförmige Folie (100) unterhalb der Endmengen von Artikeln zur Ausbildung eines Bodens des Beutels versiegelt, wobei weiter die schlauchförmige Folie (100) mittels des Nachunten-Ziehmechanismus (3) in Förderrichtung um die Länge des Beutels bewegt wird.

Revendications

1. Procédé d'emballage comprenant les étapes consistant à :

a) pincer un film mis sous forme tubulaire (100) avec un secoueur (5) en une première position de pincement sur ledit film (100) ;
 b) lâcher séquentiellement un premier lot jusqu'à un (n-1)^{ème} lot d'articles sur un total de n lots d'articles dans ledit film mis sous forme tubulaire (100) pendant qu'il est pincé par ledit secoueur (5), où n est supérieur ou égal à 2 ;
 c) secouer chacun desdits lots, du premier au (n-1)^{ème} lots d'articles, en utilisant ledit secoueur (5) avant de lâcher le lot suivant de la séquence ;
 d) lâcher le n^{ème} lot d'articles dans ledit film mis sous forme tubulaire (100) ;
 e) pincer ledit film mis sous forme tubulaire (100) avec ledit secoueur (5) en une deuxième position de pincement sur ledit film située au-dessus desdits n lots ;
 f) lâcher un autre premier lot d'articles dans ledit film mis sous forme tubulaire (100) pendant qu'il est pincé par ledit secoueur (5) ;
 g) secouer simultanément à la fois ledit autre premier lot d'articles au-dessus de ladite deuxième position de pincement et lesdits n lots d'articles situés en dessous de ladite deuxième position de pincement ; et
 h) utiliser un dispositif de scellement transversal pour sceller (7) ledit film mis sous forme tubulaire (100) sous lesdits n lots d'articles pour former un fond de sachet avant d'exécuter l'étape (e).

2. Procédé d'emballage selon la revendication 1, dans lequel, pendant l'étape (d), ledit film (100) est libéré de ladite première position pincée et le dispositif de scellement transversal (7) scelle ledit film mis sous forme tubulaire (100) sous lesdits n lots d'articles depuis le fond du sachet tandis que ledit film mis sous forme tubulaire (100) est déplacé de la longueur du sachet par un mécanisme d'entraînement (3) dans une direction de transport.

3. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit film mis sous forme tubulaire (100) est transporté le long d'un chemin de film et ledit secoueur (5) est placé sur ledit chemin de film.

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel ledit secoueur (5) secoue ledit film (100) selon un mouvement vertical.

5. Machine d'emballage comprenant :

un dispositif de scellement transversal (7) pour sceller transversalement un film mis sous forme tubulaire (100) ;

un secoueur (5) placé en amont dudit dispositif de scellement transversal (7) pour pincer ledit film mis sous forme tubulaire (100) en une position de pincement spécifiée et pour secouer des articles présents à l'intérieur dudit film mis sous forme tubulaire (100) au-dessus de ladite position de pincement, et une unité de commande (9) adaptée pour faire exécuter par le dispositif de scellement transversal (7) et le secoueur (5) un premier procédé d'emballage qui comprend les étapes consistant à :

a) pincer ledit film mis sous forme tubulaire (100) avec ledit secoueur (5) en une première position de pincement sur ledit film (100) ;

b) lâcher séquentiellement un premier lot jusqu'à un (n-1)^{ème} lot d'articles sur un total de n lots d'articles dans ledit film mis sous forme tubulaire (100) pendant qu'il est pincé par ledit secoueur (5), où n est supérieur ou égal à 2 ;

c) secouer chacun desdits lots, du premier au (n-1)^{ème} lots d'articles, en utilisant ledit secoueur (5) avant de lâcher le lot suivant de la séquence ;

d) lâcher le n^{ème} lot d'articles dans ledit film mis sous forme tubulaire (100) ;

e) pincer ledit film mis sous forme tubulaire (100) avec ledit secoueur (5) en une deuxième position de pincement sur ledit film (100) située au-dessus desdits n lots ;

f) lâcher un autre premier lot d'articles dans ledit film mis sous forme tubulaire (100) pendant qu'il est pincé par ledit secoueur (5) ;

g) secouer simultanément à la fois ledit autre premier lot d'articles au-dessus de ladite deuxième position de pincement et lesdits n lots d'articles situés en dessous de ladite deuxième position de pincement ; et

h) utiliser ledit dispositif de scellement transversal (7) pour sceller ledit film mis sous forme tubulaire (100) sous lesdits n lots d'articles pour former un fond de sachet avant d'exécuter l'étape (e). 5

6. Machine d'emballage selon la revendication 5, comprenant en outre un mécanisme d'entraînement (3) pour former ledit film mis sous forme tubulaire (100) et tirer ledit film (100) vers le bas, et dans lequel l'unité de commande (9) est en outre adaptée, pendant l'étape (d), pour libérer ledit film (100) de ladite première position pincée et sceller ledit film mis sous forme tubulaire (100) en dessous desdits n lots d'articles pour former le fond du sachet tandis que ledit film mis sous forme tubulaire (100) est déplacé par le mécanisme d'entraînement (3) de la longueur du sachet dans une direction de transport. 10

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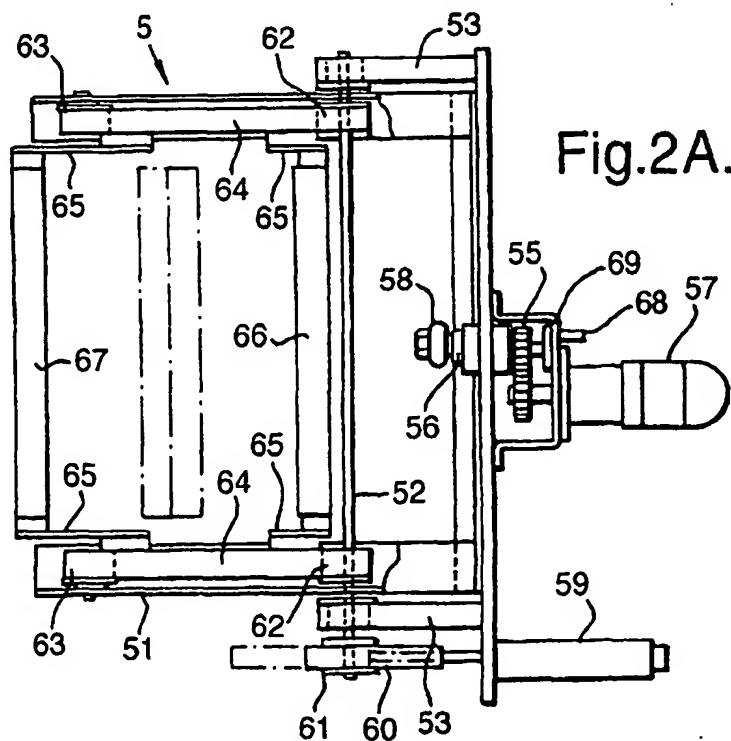
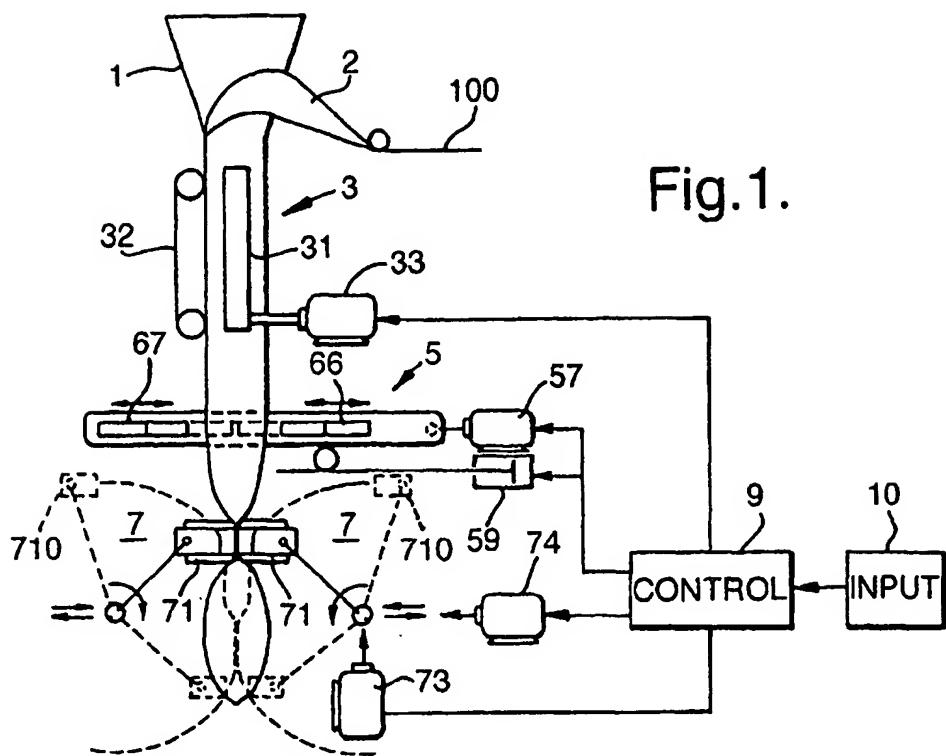


Fig.2B.

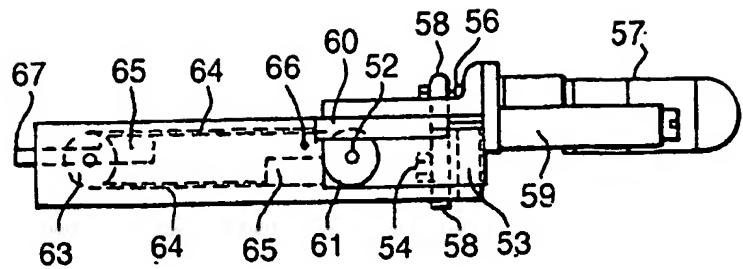


Fig.3A.

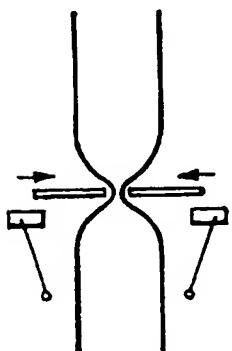


Fig.3B.

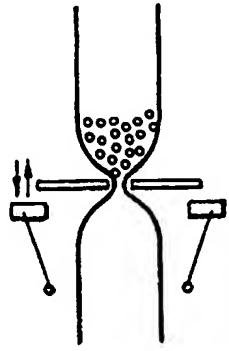


Fig.3C.

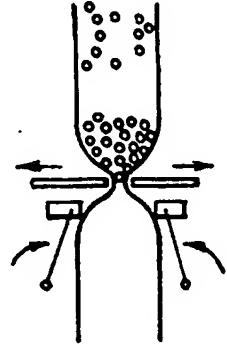


Fig.3D.

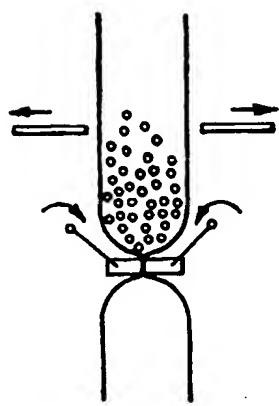


Fig.3E.

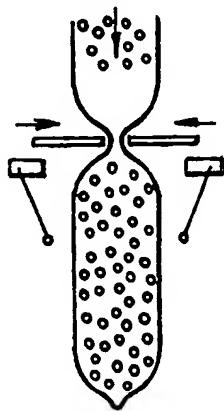


Fig.3F.

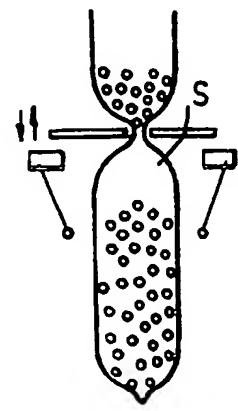


Fig.4.

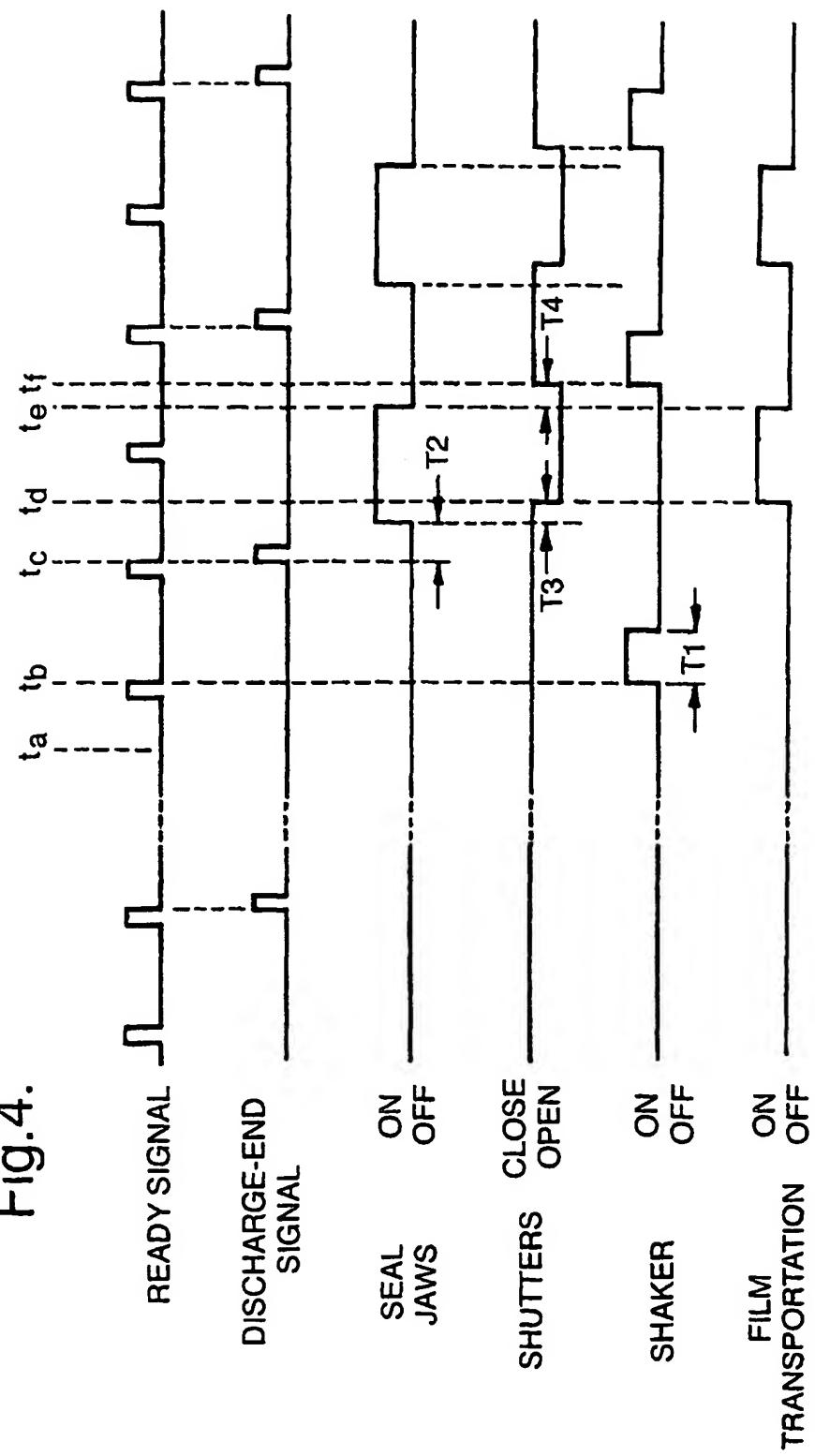


Fig.5A.

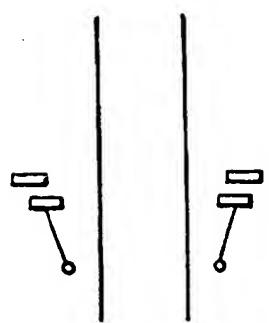


Fig.5B.

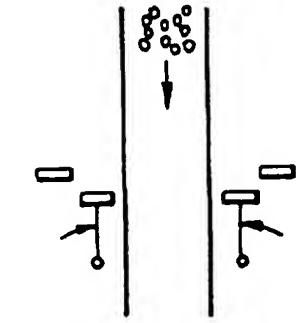


Fig.5C.

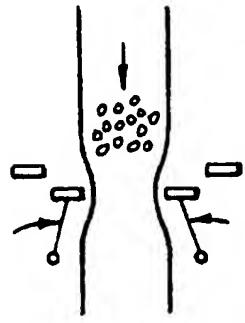


Fig.5D.

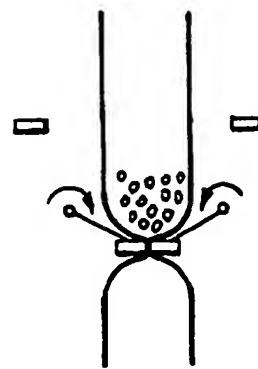


Fig.5E.

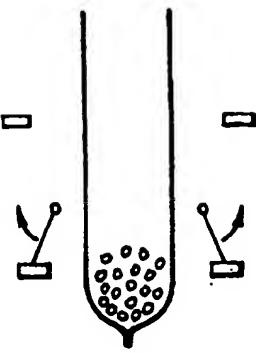


Fig.6.

